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THE PLANT DISEASE REPORTER

Issued By

THE PLANT DISEASE SURVEY

Division of Mycology and Disease Survey
BUREAU OF PLANT INDUSTRY, SOILS, AND AGRICULTURAL ENGINEERING
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The Plant Disease Reporter is issued as a service to plant pathologists throughout the United States. It contains reports, summaries, observations, and comments submitted voluntarily by qualified observers. These reports often are in the form of suggestions, queries, and opinions, frequently purely tentative, offered for consideration or discussion rather than as matters of established fact. In accepting and publishing this material the Division of Mycology and Disease Survey serves merely as an informational clearing house. It does not assume responsibility for the subject matter.

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THE PLANT DISEASE SURVEY
DIVISION OF MYCOLOGY AND DISEASE SURVEY

Plant Industry Station Beltsville, Maryland

Volume 30 April 15, 1946 Number 4

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CHECK LIST REVISION

Freeman Weiss

PISUM (LEGUMINOSAE)

PISUM SATIVUM L., PEA. Annual of Eurasia, cultivated as a garden crop throughout the United States, as a field crop for canning or freezing chiefly in the Middle Atlantic and Northeastern States, the upper Mississippi Valley and Pacific Coast; and as a seed crop in the Rocky Mountain States and Pacific Northwest.

Alternaria sp., leaf spot, seedling blight (secondary) Del., N.H., N.Y.

Aphanomyces euteiches Drechs., root rot. General except (?) northern New England and the north Pacific Coast.

Ascochyta pinodella L.K.Jones, foot rot (one of the factors in Ascochyta blight). Conn. and N.Y. to Fla., Ohio and Minn.; Calif., Colo., Mont., Oreg., Utah, Wash.

(A. pinodes L.K.Jones): Mycosphaerella pinodes.

A. pisi Lib., leaf and pod spot. General, but rare in Northwest.

Botrytis cinerea Pers. ex Fr., gray-mold rot (foliage and pods). Occasional in fields (Ida., Me., Wash., Alaska), sometimes on market peas.

Cercospora pisa-sativae Stevenson, leaf spot. Ga. P.R., ? La.

Cladosporium herbarum Pers. ex Fr., on leaves, pods and seeds. Alaska, Calif., Ill., Mich., Mont., N.Y. Saprophytic or may be confused with the following.

C. pisicola Snyder, scab; black spot (pods, stems and leaves) Calif., Oreg., Utah, Wash.; Me., Tex. Perhaps a physiologic race of the preceding. C. myriosporum Ell. & Dearn. (?) also has been reported from N.Y. and Wyo.

Colletotrichum pisi Pat., anthracnose, leaf and pod spot. Conn., Ga., Iowa, Me., Minn., Tex., Wis.

Cuscuta sp., dodder. Mo.

Erysiphe polygoni DC., powdery mildew. General.

Fusarium orthoceras App. & Wr. var. pisi Linford (F. oxysporum Schlecht. f. pisi Linford race 1), wilt. Mass. to Va., Ill., and Minn.; Calif., Colo., Ida., Mont., Oreg., Wash.

F. oxysporum Schlecht. f. pisi Snyder race 2, near-wilt. N.H. to S.Car., Ill., Nebr. and Minn.; also Calif., Colo., Ida., Mont., Oreg., Wash.

F. solani (Mart.) App. & Wr. f. pisi (F.R.Jones) Snyder & Hansen (F. martii App. & Wr. var. pisi F.R.Jones), root rot. N.Y. to Fla., Mo., and Minn.; Calif., Colo., Ida., Mont., N.Mex., Oreg., Wash., Wyo.

Fusarium spp., root rot, wilt, seedling blight. Besides the foregoing F. scirpi C.R.Lambert & Fautr. var. acuminatum (Ell. & Ev.) Wr. is reported as causing wilt in Minn. and Wis.; F.

Pisum cont.

equiseti Cda. var. bullatum (Sherb.) Wr., wilt, Minn.; F. merismoides Cda., basal stem rot, Ariz.; F. moniliforme Sheldon, associated with root rot, Miss.

Fusicladium pisicola Linford, black leaf. Ida., Utah.

Heterodera marioni (Cornu) Goodey, root knot. Ariz., Calif., Fla., N.&S.Car., Tex., Utah, Wis., Hawaii

Heterosporium sp., secondary leaf spot. Mont.

Macrophomina phaseoli (Maub.) Ashby, ashy stem blight. Tex.

Mycosphaerella pinodes (Berk. & Blox.) Vest., Mycosphaerella (Ascochyta) blight, foot rot. Widespread, probably general, but distribution records unreliable owing to confusion with Ascochyta leaf spot and foot rot.

Pellicularia filamentosa (Pat.) Rogers (Rhizoctonia solani Kuehn), root rot, stem canker, damping off. General.

Peronospora pisi (DBy.) Syd. (P. viciae (Berk.) Casp., downy mildew. General, especially in the North Central and Pacific Coast States; infrequent in the Northeast and Rocky Mountain pea districts.

Phoma sp., root and stem rot. N.J., Wis. (Perhaps a form of or sequel to Ascochyta pinodella).

P. terrestris Hansen, secondary root rot. Iowa.

Phyllosticta sp., associated with black leaf. Utah.

Phymatotrichum omnivorum (Shear) Dug., root rot. Ariz., Tex.

Phytophthora parasitica Dast., pod rot. P.R.

Phytophthora sp. (? Pythium), root rot. Calif., Conn.

Pleospora hyalospora Ell. & Ev., leaf spot. Miss.

Pseudomonas pisi Sackett, bacterial blight. General, especially in the East and South.

Pythium spp., root rot (chiefly of small roots and seedlings), damping off, pod rot. P. debaryanum Hesse reported most frequently, especially in the Middle Atlantic States, also in Fla., Wis. and Colo.; P. aphanidermatum (Edson) Fitz., Utah; P. dissotocum Drechs., Del., Md., N.J., Wis.; P. helicoides Drechs., ? Calif.; P. oligandrum Drechs. and P. salpingophorum Drechs., N.Y.; P. ultimum Trow, Calif., Mont., N.Y.

Rhizobium leguminosarum Frank em. Baldwin & Fred, in root nodules. General.

Rhizoctonia sp. (R. solani Kuehn), root and stem rot, seedling blight. See Pellicularia filamentosa.

Rhizopus stolonifer (Ehr. ex Fr.) Lind, black mold of market peas. Cosmopolitan.

Sclerotinia sclerotiorum (Lib.) DBy., stem rot, pod rot, Sclerotinia wilt. Del., Fla., N.J., Pa., Va.; Calif., Ida., Mont., Tex., Wash.

Sclerotium rolfsii Sacc., southern blight. Fla.

Septoria flagellifera Ell. & Ev., leaf spot. Minn., N.&S.Dak., Wis.

S. pisi West., leaf blotch. Widespread but infrequent.

Sporocybe byssoides Pers. ex Fr., on dead stems. Va.

Stemphylium polymorphum Bon (? S. botryosum Wallr.), leaf spot. Me.

Pisum cont.

Thielaviopsis basicola (Berk. & Br.) Ferr., black root rot. Ark., Calif., Conn., Md., Mont., N.J., N.Y., Pa., Wis.

Uromyces fabae (Pers.) DBy. (O,I,II,III), rust. Calif., Ida., Me., Mass., Minn., Nebr., N.Dak., Wash., Wyo.

Mosaic, common -- virus (Marmor leguminosarum Holmes, Pisum virus 2 K.M.Sm.). General.

Mosaic, enation (pod deforming) -- virus (Marmor pisi Holmes, Pisum virus 1 K.M.Sm.). Calif., Ida., N.J., N.Y., Oreg., Wash., Wis. Probably general but not distinguished from the preceding.

Mosaic, veinal -- virus (Marmor trifolii Holmes). N.J.

Mottle (severe mosaic) -- virus (Marmor efficiens F.Johns.). Wash., perhaps also in Colo., Ida., N.J., N.Y., Va. Properties and host range relate this virus to the yellow mosaic virus of Phaseolus, which is experimentally infectious to peas; natural infection reported in N.J. and N.Y.

Spotted wilt -- virus (Lethum australiense Holmes, Lycopersicon virus 3 K.M.Sm.). Calif., Wis., Hawaii. Probably one of the diseases that has been called streak.

Streak -- virus(es). One form of pea streak is caused by combined infection with the mottle and wilt viruses. Another, perhaps distinct, form is attributed to a single virus, pea streak virus 1 Zaumeyer (? Marmor trifolii Holmes). Pea streak has also been induced by artificial inoculation with alfalfa mosaic virus, and by one or more strains of cucumber mosaic virus. Streak diseases have been reported in the Middle Atlantic States (Del., Md., N.J., N.Y., Va.), and in the West (Calif., Colo., Ida., Mont., Wash.).

Stunt -- virus (pea mosaic virus 5 Zaumeyer). Colo. Perhaps a form of mottle (severe mosaic) and related to the yellow mosaic virus of Phaseolus.

Wilt -- virus (Marmor repens F.Johns.). Wash., ? Colo., Ida., Va. In conjunction with pea mottle virus causes a streak disease.

Chlorosis -- nutritional deficiency associated with alkaline soil. Tex., Wash. Yellowing due to deficiency of manganese and zinc has been reported in Fla.

Intumescence -- swellings on pods, in part parasitic (fungi, viruses), perhaps more frequently physiological and related to hydrotic factors. Calif., N.J., Wash.

Seed spotting -- apparently nonparasitic but cause not determined. Surface type, in Surprise and related varieties: Calif., Conn., Ida., Me., Mont., Okla., Va., Wis. Internal breakdown, in Laxtonian var.: Calif.

PISUM SATIVUM var. ARVENSE Poir., FIELD PEA. Like the species but more robust, grown as a winter annual in the South and a summer annual in the North for hay, ground cover, and soil

Pisum cont.
improvement.

Aphanomyces euteiches Drechs., root rot. Ala., Ga., Miss., Ida.
Aristastoma oeconomicum (Ell. & Tracy) Tehon, leaf spot. N.Car.
Ascochyta pinodella L.K.Jones, foot rot, blight. Ala., Ga., Miss., S.Car.
A. pisi Lib., leaf and pod spot. Ariz., Ga., La., Miss., Mont., Okla., Oreg.
Botrytis cinerea Pers. ex Fr., gray-mold blight. Ida.
Cercospora lathyrina Ell.&Ev., leaf spot. Ga., Miss.
Colletotrichum pisi Pat., leaf and pod spot. La., Tex.
Erysiphe polygoni DC., powdery mildew. Fla., Ga., La., Me., Miss., Tex.
Fusarium sp. (probably F. solani (Mart.) App. & Wr. f. pisi (F.R. Jones) Snyder & Hansen), root rot. Ala., Ga., Kans., Miss., Va., Wash.
Heterodera marioni (Cornu) Goodey, root knot. Ga., N.Car.
Mycosphaerella pinodes (Berk. & Blox.) Vest., Mycosphaerella blight. Ala., Ga., Oreg., Tex.
Peronospora pisi (DBy.) Syd. (P. viciae (Berk.) Casp.), downy mildew. Ala., Ga., La., Miss., Oreg.
Pseudomonas pisi Sackett, bacterial blight. Ga., Miss., Mont., N.&S.Car., Wash.
Pythium spp., root rot. Ala., Ga., Miss., P. graminicolum Subr. and P. irregulare Buis. have been identified.
Rhizoctonia sp. (probably R. solani Kuehn), root rot, stem canker. Colo., Ga., Kans.
Sclerotinia sclerotiorum (Lib.) DBy., stem rot. Ga., Ida.
Septoria pisi West., leaf blotch. Ala., Ga., Miss., S.Car.
Uromyces fabae (Pers.) DBy., rust. Tex.

Mosaic -- virus (? Marmor leguminosarum Holmes). Ala., Ga., Miss., Mich., N.J. M. trifolii Holmes (red clover vein-mosaic virus) has also been found on this host in N.J.

DIVISION OF MYCOLOGY AND DISEASE SURVEY

BEAN DISEASES IN SOME OF THE INTERMOUNTAIN STATES IN 1945

W. J. Zaumeyer

During the past season a disease survey of the important bean growing territories of the intermountain region was again made by the writer. As in 1944, this survey was conducted in conjunction with the inspection of bean seed crops under contract with Commodity Credit Corporation of the United States Department of Agriculture, in Colorado, Wyoming, Montana, and Idaho. The inspections were made during July, August, and early September. As in previous years only a representa-

tive acreage of both garden and field beans was surveyed in the principal growing areas of the above-mentioned States, but it is believed that the observations, in general, represent the disease conditions as they appeared throughout the different sections.

COLORADO

In Colorado the survey was made in Weld, Montezuma, La Plata, and Dolores counties. Weld County, one of the principal bean growing counties in the State, grew approximately 50,000 acres in 1945. The acreage in the other three counties was about 80,000 acres. Weld County is in the northeastern part of the State whereas the other counties are in the southwestern part. Since climatic conditions in these two areas are distinctly different, they will be treated separately with regard to disease occurrence.

Weld County:

Bacterial Blights (Xanthomonas phaseoli and Pseudomonas phaseolicola). Considerable blight was observed in both the Pinto and garden bean acreage; in fact these diseases were more widespread in 1945 than they have been since 1937. There was considerable hail during the early part of the growing season together with more than normal rainfall. In most cases, crops that showed hail damage were replanted, but where they were not, the infection was frequently so severe that 100 percent of the plants manifested the disease. The yield in such cases was reduced as much as 75 percent. The diseases were more widespread in plantings where local seed was used than where the seed originated in blight-free areas. On the other hand, in many instances where locally grown seed was used and the crop was not damaged by hail, little blight was noted.

In the garden bean acreage, practically all of the seed used for planting originated in blight-free areas. In most cases there was a small amount of infection observed which was caused principally by Pseudomonas phaseolicola. Not much of the infection could be traced to the seed but in some instances, the secondary spread caused a very high percentage of the plants to become infected. In the Pinto acreage, Xanthomonas phaseoli caused most of the damage.

In general, the two diseases were more serious in crops planted on land that had grown beans in 1944 than in crops planted on land where beans had not been grown the previous year. This fact was more clearly demonstrated during the past season than ever before because of the ideal environmental conditions for blight development and spread. Although it has been demonstrated that the bacterial blight organisms can be carried over from one year to another in this manner, it was not considered of particular importance. In general, strict crop rotation is practiced in the county and seldom are beans planted on land that grew them the previous year. In a number of instances soil transmissions of the organisms was clearly demonstrated during 1945. In one

case the Pinto variety was planted in a field, half of which had grown cabbage in 1944 and the balance beans. Although very little if any blight was noted in the 1944 planting, in 1945 the disease was very common in the portion of the field where beans were grown in 1944; but very little was noted on the old cabbage ground. In another case a variety of garden beans of blight-free origin was planted in a field, part of which had grown alfalfa in 1944 and the balance beans. During August of this year blight was noted in that part of the field planted with beans in 1944, while on the old alfalfa ground the disease was difficult to find. In a large acreage of Sieva lima beans of California origin and blight-free, the disease was noted in a portion of the planting and none was found in the balance of the field. The portion of the field showing blight had grown the same variety of lima beans in 1944, but the grower had not observed the disease that year. In part of the field where the disease was not observed in 1945 no beans were grown in 1944. It was possible to determine almost to the row where beans had been grown in 1944 by the amount of blight infection this year.

Another interesting feature with regard to severity of blight in relation to soil fertility was observed in a field of garden beans planted in a location that had grown potatoes in 1944. This field had been divided into several lands separated by relatively large irrigation ditches running the length of the field. In the fall of 1944 the entire field was plowed including ditches and planted to beans in 1945. By mid-season slight differences in vigor were observed between the plants growing in the areas of the field where the old ditches had been as compared with those in the rest of the field. This planting had been damaged by several hail storms and, in spite of the fact that the seed planted originated from a blight free territory, "halo" blight was noted. The disease was appreciably more severe in strips throughout the field corresponding to where the irrigation ditches had been in 1944 than elsewhere. It was apparent that the slightly reduced vigor of the plants growing in these strips was the possible cause for the greater blight susceptibility.

In several fields, transmission of the blight organisms by wind-blown sand was observed. The infection was not so widespread as in fields damaged by hail.

Rust (Uromyces phaseoli var. typica). Bean rust was of minor importance although conditions were ideal for the development and spread of the organism. In June, the total rainfall was 2.52 inches (+0.99 inches) which fell on 11 days of the month. In July it was again above normal, being 2.04 inches (+0.38 inches) and falling on 9 days; and in August it was 2.00 inches (+0.90 inches), falling on 9 days. The mean temperature was 63° F (-3.7°F) for June, 73.4° F (+1.2° F) for July, and 71.2° F (+0.6° F) for August.

Most of the Pinto acreage (practically all of the bush garden var-

ieties are resistant to the rust strains present in Colorado) in the irrigated sections where rust is normally a factor was dusted with sulfur before the rust was noted, thus preventing the disease from gaining a foothold.

In 1944 rust was very widespread in fields where control measures were not applied, although a very high percentage of the acreage was dusted with sulfur with very satisfactory control. It is not unlikely that the teliospore population was greatly reduced as a result of the 1944 dusting and the early dusting done this season almost completely controlled the disease. If viable spores had been present in abundance and no sulfur applied the disease would have been in epidemic form without question since conditions were excellent for development of the disease.

Root Rots (Fusarium solani f. phaseoli and Rhizoctonia sp.). In the early planted crops, these diseases were very serious. The late spring season was cold and wet and it was not until after the middle of June that the temperatures were ideal for good plant development. In some fields as many as 75 percent of the plants were infected. Most of these fields were replanted after weather conditions improved, and the crop loss in them was comparatively slight. Where replanting was not done, the stands were poor and plant development much suppressed, with a corresponding reduction in yield.

Bean Wilt (Pythium butleri). This disease had not been observed in Colorado for more than 10 years but during this season it was noted in quite a few plantings of the Refugee variety, where in some cases about 5 percent of the plants were killed. The disease was not widespread throughout the area.

Sclerotinia Wilt (Sclerotinia sclerotiorum). This disease was not observed in 1945. In 1944 it was reported for the first time in a single field where about 10 percent of the plants were killed. Careful crop rotation may be the reason the disease has been kept in check.

Anthracnose (Colletotrichum lindemuthianum). The disease was not observed.

Virus Diseases. Common bean mosaic (bean virus 1) was very widespread and caused serious losses in the Pinto acreages. In some fields 75 percent of the plants were infected, reducing the yield in such fields by one-third. No fields were observed that were relatively free of the disease and the infection ranged from 20 to 75 percent of the plants. Practically all the seed lots carried the virus, some carrying as much as 50 percent infection. Secondary spread was rapid and by mid-July it was impossible to find many fields where roguing would have been profitable. In those garden bean varieties that had previously shown considerable tolerance, more mosaic was noted than in former years. Whether bean virus 1 was the virus involved is unknown,

although the symptoms indicated that it was this virus.

Yellow bean mosaic (bean virus 2) was not widespread although diseased plants were found along the edges of fields relatively close to sweet clover. This virus has never been found as widespread in Colorado as in Wyoming, Montana, and Idaho.

Red node was not observed, although in previous years infected plants were commonly found in a high percentage of the Pinto plantings.

Montezuma, La Plata, and Dolores Counties:

As in 1944, about 80,000 acres of beans were grown in these counties in 1945. Practically all of the acreage was of the native Pinto variety. Garden beans comprised only a small portion of the total.

Bacterial Blights. Halo blight was observed in one small planting of approximately 10 acres, the seed for which had been produced in Northeastern Colorado in 1944. The particular locality in which the disease was observed had an unusual amount of precipitation and the crop had also been damaged by hail. Plantings of this same seed stock in other parts of the county where there was little precipitation and no hail damage, showed no blight. The disease was not observed in the acreages planted with locally grown seed. Common blight was not observed. It is believed that in normal years neither of the blight organisms will be of any consequence, because of unfavorable climatic conditions for their development.

Powdery mildew (Erysiphe polygoni). In a planting of approximately 20 acres, this disease was quite widespread, causing defoliation and premature ripening of the crop. Since the infection started late in the season after the pods were well set, little damage resulted. This is the first time in the past 18 years that the writer has observed this disease as widespread in the intermountain States.

Root Rots. These diseases were of minor significance, taking the three counties as a whole, but in one large acreage Fusarium solani f. phaseoli had killed a high percentage of the plants with a decided reduction in yield.

Rust and Anthracnose. Neither of these diseases was observed.

Mosaic. Only a trace of bean virus 1 was noted, with no resulting damage.

WYOMING

The survey was made in the northern part of the State in Washakie, Big Horn, and Park Counties. Most of the beans in the State are produced in these counties.

Bacterial Blights. Unlike 1944, neither of the two bacterial blights was widespread. In Washakie County, halo blight was observed in several plantings made with locally grown seed, which had been damaged by hail. In other fields where hail damage was not noted the diseases were not observed. In Park County a trace of the disease was found in several fields where the seed originated from blight-free areas. In several instances locally grown seed as well as seed from areas where the blights are common produced considerable disease.

Rust. Bean rust was very widespread and caused much damage in Big Horn and Park counties. None was observed in Washakie County although less acreage was surveyed here than in the others. Practically all of the infection was in the Great Northern acreage, although it was also seen in fields of Tenessee Green Pod, which is one of the few bush garden varieties highly susceptible to many of the races. The other varieties were free from infection. In a number of instances where the fields were dusted with sulfur at the rate of 20 to 25 lbs. to the acre, the disease was fairly well controlled. In most cases, the increase in production was at least 600 to 800 lbs. of seed per acre. Many undusted fields produced less than 1000 lbs. per acre. Fields located in close proximity to old bean straw stacks, most of which harbored abundant teliospores from the 1944 crop, showed greater infection than other fields. Similarly, in fields that had grown beans for the past several years rust infection was noted much earlier in the season than in those fields that had grown other crops for one or two years previously. In the former fields secondary spore dissemination was rapid and widespread and the crop damage in some cases ran as high as 65 percent, while in the latter fields it was appreciably less even though a high percentage of the plants were infected. In a number of fields that had grown beans for the first time and which were located at some distance from other bean fields, rust appeared too late to do any particular damage.

Most of the beans in this section are combine-harvested and the diseased straw is left throughout the field, which allows for a thorough dissemination of the teliospores for infection the following year. If these fields were plowed in the fall and the diseased straw buried much less infection would result in the next year's crop.

Sclerotinia Wilt. This disease was just making its appearance in the Great Northern acreage at the time of the survey. In some cases it was very common. The disease was not observed in the garden bean varieties, all of which were bush types. This type of growth allows for better field aeration than the viny dry-bean types which produce a heavy matting of growth relatively early in the season. In such fields the humidity is quite high, which is ideal for the development of the organism.

Anthracnose. This disease was not observed.

Virus Diseases. Common bean mosaic was not widespread. It was

noted in Pinto fields but very little was seen in the garden and Great Northern varieties. Practically of the Great Northern acreage is planted with the mosaic-resistant strains.

Yellow bean mosaic was common along the edges of the fields, particularly of the garden varieties, although the disease was also noted in Great Northerns. Sweet clover, one of the hosts of the virus, is grown in these counties as a green manure crop and also is very commonly found along fence rows and irrigation ditches. Much of it is mosaic infected, and the virus is spread by aphids from such plants to beans. In general, the virus does not extend into the fields to any great distance. It is believed to be one of the nonpersistent virus types and does not survive in the aphid for any length of time.

Greasy pod and red node were not common, although the former virus was quite widespread in several fields of the Tendergreen variety.

MONTANA

The survey in Montana was made in Carbon and Yellowstone counties.

Bacterial Blights. Unlike 1944, these diseases were not widespread and caused very little damage in the acreage inspected. The diseases were fairly common in a few fields of garden beans. This can be explained by the differences in climatic conditions which prevailed in the 2 years, especially during the months of June and July which are the critical months for the development and spread of organisms. In 1944 when Xanthomonas phaseoli was very widespread (PDR 28, No. 5) the rainfall was considerably above normal and the hail damage quite serious. In June 1944 the rainfall was 10.17 inches (+8.15 inches) while in June 1945 it was 2.67 inches (-0.39 inch). Two hail storms were reported in 1944 and none in 1945. In July 1944 the precipitation was 1.11 inches while in the same month of 1945 it was 0.80 inches. There was one hail storm during the month in both years. In August of 1944 the rainfall was 1.52 inches while in the same month of 1945 it was 1.74 inches. Two hails were reported in 1944 and one in 1945.

Rust. This disease, especially in the east central part of Carbon County, was very widespread and caused considerable yield reduction in the Great Northern acreage. There was less infection in the northeastern part of the county and in the southwestern part of Yellowstone County. In the section around Billings and Huntley, no rust was observed. In fields where rust was serious, the yields were reduced by at least 50 percent. In parts of Carbon County in the vicinity of Bridger practically all of the Great Northern fields were infected. In quite a few instances, where fields were dusted twice with sulfur, the disease was well controlled. A single dusting usually controlled the primary infection but not the secondary spread caused by spores blown from nearby undusted fields later in the season.

In many cases where the disease was severe, beans had been planted in the same field in 1944. As in Wyoming, most of the crops are combine-harvested and the straw is left in the field and not plowed under until the following spring. Bean rust was serious in 1944 and it is likely that the primary infection in such fields originated from the infected straw.

Sclerotinia Wilt. This disease was again observed causing fairly severe losses in some fields of Great Northern beans. None was noted in fields of the bush garden varieties.

Root Rots. These diseases were of no particular concern in the acreage inspected although one could find infected plants in most of the fields that were visited. In several fields Fusarium solani f. phaseoli had reduced the stand about 20 percent.

Anthracnose. This disease was not observed.

Virus Diseases. Common bean mosaic was not very widespread. Very little was observed in the Great Northerns since the mosaic-resistant strains are mostly used. In some fields of the garden varieties the percentage of infected plants was high with considerable stunting and reduction in yield.

Yellow bean mosaic was found in practically all the fields visited. In some fields of the garden varieties it was very serious, causing much yellowing and stunting of the plants with a marked yield reduction. In general the infection was limited to the edges of the fields, but in several instances it was noted throughout the entire field, which is quite uncommon with this virus.

Red node was found in a high percentage of the Great Northern fields especially along the edges of the fields. However, only a relatively small percentage of the plants in any field was infected.

IDAHO

In Idaho the survey was made in Twin Falls, Jerome, and Minidoka counties, which are in the southern part of the State.

Bacterial Blights. Traces of halo blight were observed in a relatively few fields. Common blight was not found. In one field where the seed planted was said to have been of southern origin, the disease was very serious. In another case where the seed originated from an area where blight is common in certain years, a high percentage of the plants were killed by the organism. In this planting considerable secondary spread was noted. In several other fields, traces of the disease were observed.

Anthracnose and Rust. These diseases were not found.

Root Rots. These diseases, as in 1944, were quite common although in general the injury to the plants was not as apparent as in 1944. In several fairly large plantings of both the garden and Great Northern varieties, a high percentage of the plants were killed and premature ripening of those remaining was observed, with a decided reduction in yield.

Sclerotinia Wilt. This disease was noted in a few fields of field varieties but not in the bush garden varieties.

Virus Diseases. Common bean mosaic was widespread in fields of susceptible varieties. More infection was noted in the Burley section (Minidoka County) where only a small percentage of the acreage is planted to mosaic-resistant varieties. The growing season in this territory is generally shorter than it is in Twin Falls and Jerome counties and hence the acreage of the later maturing mosaic-resistant Great Northern varieties is small.

Yellow bean mosaic was very common in both the garden and field bean varieties. The infection was in general restricted to the edges of the fields where in most cases mosaic-infected sweet clover was found growing along fence rows and ditches.

The condition, which has been reported previously and presumably is of a virus nature, that produces a bronzing of the leaves and a shininess of the pods of many garden varieties, was again very widespread. It was not found in the varieties that are resistant to bean virus 1. Although no appreciable stunting of infected plants results, premature ripening together with pod malformation causes yield reduction.

What may have been the virus reported from New York State by B. L. Richards, Jr., as a strain of bean virus 1 was noted in a number of plantings of U. I. No. 15 Great Northern. This variety is resistant to bean virus 1 but considerable mosaic was observed in a number of plantings, especially in the Twin Falls area. The symptoms produced were almost identical with those produced by bean virus 1, but considerably different from those of bean virus 2. How widespread this virus strain is among the garden varieties is unknown, but it is likely that it may be quite common since the incidence of mosaic within the past 5 years in many of the varieties which heretofore appeared to be tolerant to bean virus 1 is high. Since the symptoms produced by bean virus 1 and the new strain are practically identical, greenhouse analysis in most cases appears to be necessary for positive identification.

Only a trace of red node virus was observed.

Curly top was fairly widespread in the Buhl and Casselford sections in the susceptible varieties. In one field of Kentucky Wonder beans about 60 percent of the plants were killed.

DIVISION OF FRUIT AND VEGETABLE CROPS AND DISEASES, BUREAU OF PLANT INDUSTRY, SOILS, AND AGRICULTURAL ENGINEERING

WINTER INJURY OF FALL SEEDED WHEAT IN IDAHO[1]

Earle C. Blodgett

From time to time in Idaho there have been reports of severe loss of winter wheat seedings. This damage has been called winter injury and has been frequently attributed to smothering by deep snows. According to Remsberg and Hungerford (2) in 1933 and Remsberg (3) in 1940, snow scald (or sclerotium blight (1)) caused by Typhula spp. (T. itoana Imai and T. idahoensis Remsberg (3)) has been known in the State for many years and in some seasons has caused extensive damage in certain counties. This winter injury has been shown by these writers and in the survey reported herein, to be due largely to the action of parasitic fungi.

In 1943, 1944, and 1945 while conducting surveys for the Emergency Plant Disease Prevention Project, U. S. Department of Agriculture, the writer was frequently questioned about the cause and control of winter injury of fall seeded wheat. The inquiries came principally from county agents and growers in Teton, Fremont, Bonneville, and Caribou Counties in the eastern part of the State. Preliminary surveys gave evidence of considerable damage in certain large areas in Teton and Fremont Counties, where growers have had to discontinue growing winter wheat because of the severe winter kill. The general opinion of many farmers is that winter injury is becoming greater each year. Since there had been no close contact with the problem in recent years, it seemed desirable to survey the situation and bring at least observational evidence up to date.

At the suggestion of one of the county agents as complete a survey as feasible was undertaken in 1945. The writer contacted all the county agents in the State and suggested that their winter wheat growers be canvassed by card asking for the following information:

1. Varieties of winter wheat seeded.
2. Estimated acreage seeded to winter wheat.
3. Estimated acreage of winter wheat reseeded.

Although the response was far short of being complete, a fairly representative survey was possible. In addition, the writer examined many fields representing hundreds of acres in Bonneville, Madison, Fremont and Teton counties. Samples were collected and sent to Dr. W. W. Ray, Mycologist, located at Stillwater, Oklahoma who confirmed the writer's tentative diagnosis of the diseases involved. In addition to snow scald (Typhula spp.), the snow mold fungus Calonectria graminicola (B. & B.) Wr. (Fusarium nivale (Fr.) Ces.) was consist-

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[1]The writer wishes to express his sincere appreciation to the County Agents, the Soil Conservation Service and others who cooperated in this survey.

Table 1. Showing by counties in Idaho the average acreage of winter wheat seeded in 1942, 1943 and 1944 and the acreage seeded in 1944 and reseeded in 1945 because of winter injury due principally to snow scald (Typhula itoana or T. idahoensis) and snow mold (Fusarium nivale).

County	Average winter wheat acreage for 1942, 1943, 1944[a]	Report by county agent and growers: Acres seeded in 1944	Acres reseeded in 1945
Boundary	700	7,000	0
Bonner	800	---	---
Kootenai	19,600	---	---
Benewah	11,000	6,668	6
Shoshone	0	---	---
Latah	50,700	---	---
Clearwater	2,900	---	---
Nez Perce	49,300	---	0
Lewis	36,200	40,000	0
Idaho	47,400	42,000	0
Adams	900	---	---
Valley	400	---	---
Washington	4,100	---	---
Payette	400	2,000	0
Gem	1,000	---	---
Boise	800	---	---
Canyon	300	---	---
Ada	200	---	---
Elmore	3,500	---	0
Owyhee	200	---	---
Lemhi	0	---	---
Custer	0	---	---
Butte	100	---	---
Camas	27,800	3,100	0
Blaine	800	---	---
Gooding	100	---	---
Lincoln	200	---	---
Minidoka	600	---	---
Jerome	100	---	---
Twin Falls	1,100	---	---
Cassia	7,800	8,443	100
Clark	100	---	---
Fremont	5,600	3,687	1,765
Jefferson	400	---	---
Madison	35,400	1,160	600
Teton	17,100	4,652	2,624
Bonneville	37,400	30,519	2,784
Bingham	700	5,910	560
Power	84,000	95,000	Trace
Bannock	52,600	---	---
Caribou	4,000	---	---
Oneida	65,300	---	---
Franklin	19,000	---	---
Bear Lake	5,100	---	---

[a]These data were furnished through the courtesy of Richard C. Ross, Agricultural Statistician, U. S. Department of Agr., Boise, Idaho

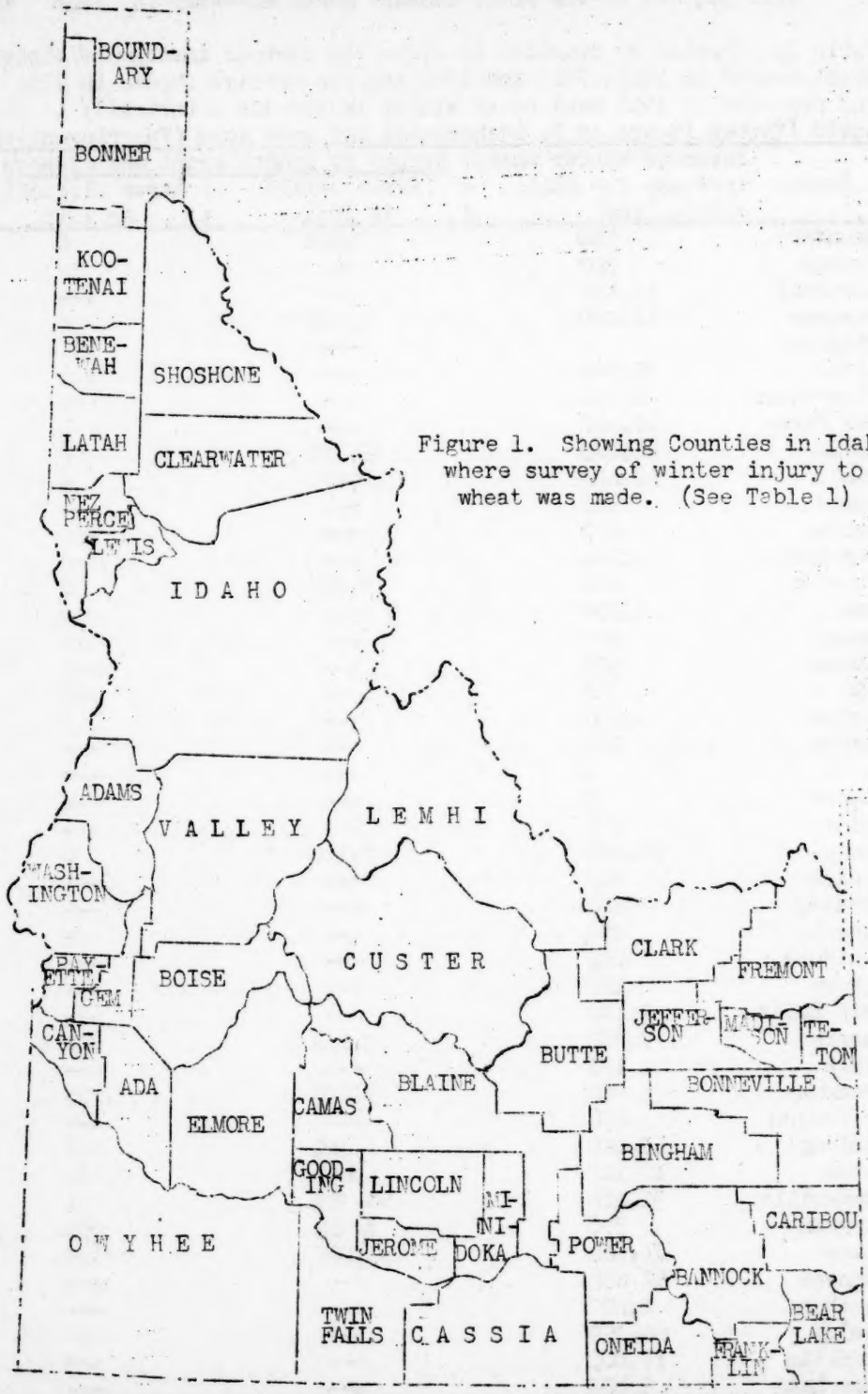

Figure 1. Showing Counties in Idaho where survey of winter injury to wheat was made. (See Table 1)

ently isolated. In some large fields where 90 percent or so of the plants were dead in 40 or 50 acre patches, either one or both diseases occurred.

Diagnosis in the field was quite easy because of the difference in appearance of affected plants. The snow scald plants were characterized by the white to grayish color of the matted plants, the presence of numerous sclerotia and the nearly complete disintegration of the leaf tissue. The snow mold-affected plants were tan to yellow in color, more upright in position, and in nearly every case showed pink spore masses near the crown. The dead plant tissue was stringy and tough and no sclerotia were present.

So far as is known snow mold previously has not been regarded as a factor in winter killing of wheat in Idaho. Snow scald seems to be largely limited to areas of exceptionally deep snow, while the distribution of snow mold is more general and apparently not necessarily correlated with deep drifts and heavy snow cover.

It will be seen from the data presented in Table 1 and Figure 1 that: 1. Winter wheat injury in 1944-45 was confined almost entirely to the counties in northeastern Idaho. 2. Of the area surveyed in Fremont County nearly half the acreage and in Teton County over half the acreage was winter killed and reseeded. Although there was no response from many counties, especially those of small acreages, sufficient contact was maintained in all these areas to be rather certain that winter injury was not appreciable.

As a result of the survey and considering previous records the following discussion of points and conclusions seems pertinent.

1. All varieties involved in the area surveyed where winter injury was present in 1945 were susceptible; the principal varieties being Turkey and Ridit. In the northern counties Rex and Forty-fold types predominated.

2. Winter wheat in most of the fields in northeastern Idaho, where the infestation is severe, is snow covered before the ground is frozen and the soil remains unfrozen during the winter. This factor seems to be of great importance, whether at high altitudes (over 6,000 feet in Teton County) or at lower altitudes such as Sandpoint (under 2,000 feet).

3. The general opinion is that early seeded wheat is injured most. This probably is true but extent of injury may also depend upon other factors, such as the amount of inoculum present, since some fields of early seeding were observed to be only slightly affected.

4. The general opinion of growers, in Teton County especially, is that winter injury is becoming greater each year, indicating a

build-up of inoculum. A few growers, however, state that they have no loss on new land not previously cultivated. Since at least some of this land is naturally grass land, the interesting question is raised regarding the susceptibility of native grass species.

5. Adapted winter wheat varieties in Idaho are not killed out during the winter by low temperatures. In some seasons heaving (mechanical injury) and drowning (as by water and heavy ice sheets) may occur, but they are comparatively of little importance. Winter injury to winter wheat is caused principally by active fungus parasites resulting in snow scald and snow mold.

6. Although no appreciable loss occurred in 1945 in the Panhandle area and in Camas and Elmore Counties, the localities have had considerable damage in certain previous years.

7. The Palouse area, the Camas Prairie area (Idaho County) and the southeastern area so far as information is available, have never had appreciable loss from winter injury, although snow cover in parts of these sections is quite comparable to that in the affected areas. Some farmers in Nez Perce County have indicated losses in certain fields in recent years.

8. It is believed that crop rotation is a factor in disease incidence. Observations[2] at the Tetonia Branch Station in May 1945 showed:

   a. Half of one field planted to sweet clover, then wheat, disclosed practically no winter kill, while the other half seeded to a mixture of sweet clover and mountain brome, then wheat, hadabout 30 to 40 percent winter kill. The grass either builds up the fungi or it counteracts the effect of the sweet clover in some way. Biological action involved in turning under the sweet clover for green manure may destroy part of the inoculum.

   b. Crested wheat in a rotation tends to favor fungus development, or at least it apparently increases the amount of winter kill.

9. There is a distinct possibility that control of these fungus diseases could be had economically by the use of the proper fungicides and stickers applied by airplane or ground machinery just before the plants are snowed in for the winter. If it is

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[2] These observations were made by the writer in cooperation with Hugh McKay, Soil Conservationist, and W. A. Moss, Superintendent, Tetonia Branch Station, Tetonia, Idaho, in May 1945.

economical to reseed areas where snow drifts and winter killing occurs, it should appear feasible, if control is possible, to dust by airplane or by suitable machinery used for dusting peas. More should be known, however, of the sources of inoculum and mode of infection.

10. The presence of snow mold (Fusarium nivale) in the fields either alone or in combination with snow scald (Typhula itoana and T. idahoensis) may be partly responsible for the increased damage and apparent disregard for the necessity for deep snow banks.

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2. Remsberg, Ruth, and C. W. Hungerford. Certain sclerotium diseases of grains and grasses. Phytopath. 23: 863-874. 1933.
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(Formerly EMERGENCY PLANT DISEASE PREVENTION PROJECT, MOSCOW, IDAHO.)

FUNGI ISOLATED FROM DORMANT GRASSES AT MANDAN, NORTH DAKOTA, IN JANUARY

Roderick Sprague

During the period January 16 to 22, 1946, isolations of saprophytic and possibly parasitic fungi were made from the roots of perennial grasses obtained from frozen and snow-covered plants during sub-zero weather. The grasses used included the following wheatgrasses: Crested, western, slender, and intermediate. In addition, Canada wild-rye, Russian wild-rye, smooth brome, Hordeum brevisubulatum, big bluestem, little bluestem, blue grama, and switchgrass were used. The culturing was attempted on water agar after pieces of the host had been washed for six hours in running water. Half of the 120 isolation plates, which included about 1,000 fragmentsof roots and crowns, were incubated at room temperatures and the remainder were incubated in the refrigerator at virtually freezing conditions (31 to 33° F). While a number of isolates were obtained from the refrigerator material, only one pure culture was obtained that was capable of steady growth at near-freezing conditions. This is an undetermined fungus that produces a compact sub-cottony white colony.

After failing to find any large number of low temperature-favored fungi in the plates, all were incubated at room temperatures and the abundant saprophytic colonies transferred to potato-dextrose agar. The 548 pure cultures were composed of the following species:

Fungus	No. of pure cultures	Fungus	No. of pure cultures
Alternaria tenuis	10	Gloeosporium (pink)	96
Basidiomycete, miscellany	5	Gloeosporium (carrot red)	52
Curvularia geniculata	7	Helminthosporium sativum	8
Fusarium acuminatum	153	Penicillium spp.	5
F. equiseti	31	Rhizoctonia solani	10
F. (nivale)	5	Trichoderma spp.	20
F. oxysporum	49	Miscellany	96
F. poae	1		

It may be of interest to note the abundance of Fusarium acuminatum in the isolates. It was common in most hosts, particularly in a creeping strain of crested wheatgrass (Agropyron michnoi), and in the crowns of alfalfa which was included with the grass collections for comparison.

The mucose Gloeosporium, which may be two distinct species, was common. The pink, later carbonaceous, cultures were most common, but the carrot red strain was also abundant. In passing, it should be mentioned that pathogenicity trials with the pink strain were repeatedly negative but one trial with what we now recognize as the carrot red strain was positive in earlier trials.[1] Recent inoculations with several isolates of the carrot red strain have resulted in some seed rot in crested wheatgrass, Kubanka durum wheat, blue grama, garden beets, field beans, Chinese cabbage, and alfalfa. Germination is depressed in some other crops, which recovered, however. The nature of the injury caused by this fungus is under investigation.

On the basis of this preliminary winter study, it is indicated that no severe injury such as that caused by a species of basidiomycete in Alberta[2] on legumes and Gramineae, occurs at Mandan, at least not during a completely closed winter such as that of 1945-46. Further isolations obtained during more open winters and during the spring thaw are needed, however.

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[1] Sprague, R. Rootrots of cereals and grasses in North Dakota. N. D. Agr. Exp. Sta. Tech. Bul. 332. 1944.

[2] Broadfoot, W. C., and Cormack, M. W. A low temperature basidiomycete causing early spring killing of grasses and legumes in Alberta. Phytopath. 31: 1058-1059. 1941.

COOPERATIVE FLAX SEED TREATMENT TESTS IN 1945[1]

F. J. Greaney

A uniform flax seed treatment experiment, similar to the one made at 11 stations in 1944, was carried out in 1945 to obtain information concerning theeffect on stand (seedling emergence) of treating sound and fractured (mechanically-injured) seed of flax with different fungicidal seed treatment materials. The fungicides, and rates of application tested, are given in Table 1. Preliminary tests of the seed and seed treatments used in 1945 were made in beds of non-sterile soil in the greenhouse. The results of these tests are summarized in Table 1.

Table 1. Effect on emergence (stand) of treating sound and fractured seed of Royal flax[b] with different dosages of certain standard fungicides. Results of preliminary tests in beds of non-sterile soil in the greenhouse. (Data are means of 3 trials)

Seed treatment		Percentage seedling emergence	
Fungicide	Oz. per bu.	Sound seed[c]	Fractured seed[d]
New Improved Ceresan	1/4	79.3	22.3
	1/2	79.0	31.0
	1	82.7	52.0
	1 1/2	83.3	61.7
	2	81.7	61.7
DuBay 1452-F	1/2	82.3	31.3
	1	82.0	41.0
Spergon	1 1/2	82.0	23.0
	3	83.7	18.3
Arasan	1 1/2	82.3	29.0
	3	83.3	42.0
None (check)	0	84.3	25.7
Necessary difference, 5% level	---	(a)	11.0
Mean of all seed treatments		82.2	36.6
Necessary difference, 5% level			4.4

[a] Differences between seed treatments insignificant statistically.
[b] Seed from flax grown at Winnipeg in 1942.
[c] Hand-threshed. Plants passed through rubber rollers. No seed fractured. Four percent of seeds weathered.
[d] Machine-threshed. Plants threshed with steel-cylindered threshing machine. Percentage of seeds fractured = 48 percent.

[1] Under the auspices of the Committee for the Coordination in Cereal and Vegetable Seed Treatment Research of the American Phytopathological Society.

The plan of the field experiment was the same as that used in 1944 (PDR Suppl. 159, pp. 215-219). It consisted of a split block design with 4 randomized blocks. Sound seed was planted in one half of the block and fractured seed in the other. In each split block there were 12 plots, representing 12 different seed treatments. Each plot consisted of one row. The rows were 10 feet long, and spaced one foot apart. Three hundred seeds were planted in each row. The seed was planted with a V-belt seeder. Stand data were taken at the early seedling stage.

The seed was treated at the Winnipeg Laboratory, and tests were planted at the following cooperating stations in the United States and Canada: Geneva, New York (W. F. Crosier); Madison, Wisconsin (H. L. Shands); Ames, Iowa (C. S. Reddy); Brookings, South Dakota (W. F. Buchholtz); Fargo, North Dakota (W. E. Brentzel); St. Paul, Minnesota (M. B. Moore); Bozeman, Montana (R. H. Bamberg); Pullman, Washington (C. S. Holton); Edmonton, Alberta (A. W. Henry); Saskatoon, Saskatchewan (H. W. Mead) (crop failure); and at Winnipeg, Morden, Brandon, and Gilbert Plains in Manitoba (H. A. H. Wallace and F. J. Greaney). The seedling stand results for the different stations are given in Tables 2, 3, and 4.

As the data in Table 2 show, no beneficial stand effects were observed at any of the 13 stations in 1945 when sound, high quality seed of Royal flax was treated with such standard seed disinfectants as New Improved Ceresan, Arasan, and Spergon.

At all stations in 1945, treatment of severely fractured flax seed with New Improved Ceresan, applied either at the rate of 1 oz., 1 1/2 oz., or 2 oz. per bushel of seed, markedly increased seedling stand (Table 3). At 10 of the 13 test stations the increases observed were significant statistically. In the greenhouse tests (Table 1), and in some of the field tests (Table 3), treatment of fractured seed with New Improved Ceresan increased seedling stand more than 100 percent.

Statistically significant increases in stand were found when the data from all the field locations were summarized and analyzed (Table 3). In general, the best treatment was New Improved Ceresan applied at the rate of 1 1/2 oz. per bu. This dosage of New Improved Ceresan was more effective than smaller dosages (1/4, 1/2, or 1 oz. per bu.), but there was no significant difference between the 1 1/2 and 2 oz. rates. DuBay 1452-F (7.7% ethyl mercury p-toluene sulfonanilide) applied at the rate of 1/2 and 1 oz. per bu. was almost as effective as New Improved Ceresan applied at these rates. Arasan applied at the rate of 1 1/2 oz. or 3 oz. per bu. was not equal to New Improved Ceresan applied at the 1 oz. rate, or higher rates, but it was superior to Spergon when this fungicide was used at the 1 1/2 oz. and 3 oz. rates.

The results in Table 4 indicate the importance of sowing sound

Table 2. Effect on seedling emergence (stand) of treating sound seed of Royal flax[b] with different dosages of certain standard fungicides at stations in Canada and the United States in 1945. (Data are means of 4 plots)

Seed treatment		Percentage Seedling Emergence												
Fungicide	Oz. per bu.	Winnipeg, Man.	Morden, Man.	Brandon, Man.	Gilbert Plains, Man.	Edmonton, Alta.	Geneva, N.Y.	Madison, Wis.	Ames, Iowa	Brookings, S.D.	Fargo, N.D.	St. Paul, Minn.	Bozeman, Mont.	Pullman, Wash.	Average (13 stations)
New Improved Ceresan	1/4	70	50	77	60	70	72	47	69	64	75	65	69	64	65.5
	1/2	70	53	69	62	77	68	50	67	66	78	73	73	65	67.0
	1	63	55	71	63	75	70	49	68	72	77	73	73	59	66.8
	1 1/2	71	54	74	66	76	66	45	69	68	78	70	65	67	66.8
	2	71	54	74	61	74	70	49	62	67	74	70	68	69	66.4
DuBay 1452-F	1/2	73	57	72	60	77	64	49	64	63	78	73	68	66	66.5
	1	70	50	77	64	73	68	44	70	66	76	67	67	64	65.8
Spergon	1 1/2	72	56	73	59	70	67	51	63	66	77	69	74	59	65.8
	3	68	58	70	59	76	68	49	66	63	72	70	65	68	65.5
Arasan	1 1/2	70	60	70	64	73	71	47	67	60	75	68	72	60	65.9
	3	73	59	73	66	72	62	49	66	62	71	70	69	66	66.0
None (check)	0	69	49	76	59	73	71	44	62	63	77	71	73	65	65.2
Necessary difference, 5% level	---	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	12.5	(a)	(a)	(a)	(a)

(a) Differences between seed treatments insignificant statistically.
b Condition of seed = 4 percent of seeds weathered.

Table 3. Effect on seedling emergence (stand) of treating fractured seed of Royal flax[b] with different dosages of certain standard fungicides at stations in Canada and the United States in 1945. (Data are means of 4 plots)

Percentage Seedling Emergence

Seed treatment																
Fungicide	Oz. per bu.	Winnipeg, Man.	Morden, Man.	Brandon, Man.	Gilbert Plains, Man.	Edmonton, Alta.	Geneva, N.Y.	Madison, Wis.	Ames, Iowa	Brookings S.D.	Fargo, N.D.	St. Paul, Minn.	Bozeman, Mont.	Pullman, Wash.	Average (13 stations)
New Improved Ceresan	1/4	31	6	39	10	52	31	21	53	34	57	19	41	24	32.2
	1/2	37	7	46	16	52	34	21	60	43	62	21	49	29	36.7
	1	38	8	51	20	66	34	29	63	47	61	32	54	33	41.2
	1 1/2	50	17	56	31	67	41	25	61	48	65	40	56	33	45.4
	2	51	18	56	41	61	40	27	60	50	62	41	60	43	46.9
DuBay 1452-F	1/2	35	5	44	13	46	31	24	56	42	62	18	49	24	34.5
	1	40	6	44	18	58	34	21	59	38	62	23	50	29	37.1
Spergon	1 1/2	31	6	38	9	51	26	21	47	36	54	23	38	27	31.3
	3	35	8	40	10	54	30	23	51	39	55	20	40	34	33.8
Arasan	1 1/2	38	8	40	17	66	31	23	55	39	60	17	48	32	36.5
	3	41	11	46	24	64	30	27	60	47	60	23	55	29	39.8
None (check)	0	29	4	32	12	44	27	18	49	37	57	15	45	26	30.4
Necessary difference, 5% level	—	9.4	4.8	9.1	4.8	11.4	5.3	(a)	10.4	7.0	(a)	6.6	7.4	(a)	2.5

(a) Differences between seed treatments insignificant statistically.
[b] Percentage of seeds fractured (cracked, chipped, split, etc.) = 48 percent.

Table 4. (Summary). Effect on emergence (stand) of treating sound and fractured seed of Royal flax[b] with different dosages of certain standard fungicides. Average results of 13 stations in the United and Canada. (Data are means of 52 plots)

Percentage Seedling Emergence

Seed treatment		Condition of seed		Actual
Fungicide	Oz. per bu.	Sound[c] (a)	Fractured[d] (d)	difference (A - B)
New Improved Ceresan	1/4	65.5	32.2	33.3
	1/2	67.0	36.7	30.3
	1	66.8	41.2	25.6
	1 1/2	66.8	45.4	21.4
	2	66.4	46.9	19.5
DuBay 1452-F	1/2	66.5	35.5	31.0
	1	65.8	37.1	28.7
Spergon	1 1/2	65.8	31.3	34.5
	3	65.5	33.8	31.7
Arasan	1 1/2	65.9	36.5	29.4
	3	66.0	39.8	26.2
None (Check)	0	65.2	30.4	34.8
Necessary difference, 5% level	--	(a)	2.5	23.8
Average of all seed treatments		66.1	37.2	28.9
Necessary difference, 5% level			--	6.9

(a) Difference between seed treatments insignificant statistically.

[b] Seed from flax grown at Winnipeg in 1942.

[c] Hand-threshed. Plants passed through rubber rollers. No seeds fractured. Four percent of seeds weathered.

[d] Machine-threshed. Plants threshed with steel-cylindered threshing machine. Percentage of seeds fractured = 48 percent.

Table 5. Effect on emergence (stand) and yield of treating Royal flax[b] with different dosages of certain standard fungicides. Average results of 4 stations (Winnipeg, Morden, Brandon, and Gilbert Plains) in Manitoba. (Data are means of 16 plots)

Seed treatment		Stand (Percentage emergence)		Yield (Bu. per acre)	
Fungicide	Oz. per bu.	Sound seed[c]	Fractured seed[d]	Sound seed	Fractured seed
New Improved Ceresan	1/4	64.3	21.6	28.4	22.3
	1/2	63.8	26.7	27.6	23.6
	1	62.9	29.3	27.9	26.0
	1 1/2	65.3	38.6	28.6	27.2
	2	65.2	41.3	28.5	26.9
DuBay 1452-F	1/2	65.6	25.2	28.3	25.4
	1	65.4	27.0	27.9	24.9
Spergon	1 1/2	64.3	21.3	27.9	21.6
	3	64.5	23.1	--	--
Arasan	1 1/2	66.6	25.7	27.2	24.0
	3	66.8	30.5	--	--
None (check)	0	63.6	19.4	28.4	20.6
Necessary difference, 5% level	--	(a)	4.8	(a)	2.3
Average of all seed treatments		64.9	27.5	28.1	24.2
Necessary difference, 5% level		6.5		2.2	

(a) Differences between seed treatments insignificant statistically.

b Seed from flax grown at Winnipeg in 1942.

c Hand-threshed: Plants passed through rubber rollers. No fractured seed. Four percent of seeds weathered.

flax seed, and show that seed treatment is only partly effective in reducing the losses in stand from fractured seed. Furthermore, they emphasize the importance of preventing mechanical injury to flax seed that is to be used for seeding purposes.

Yield experiments of the seed and seed treatments used in the above-mentioned stand tests were made in 1945 at the 4 Manitoba stations. A split block design with 4 randomized blocks was used. There were 10 plots (10 seed treatments) in each split block, and each plot consisted of 4 rows. The rows were 18 feet long and 9 inches apart. At harvest, yield data were taken on the 2 centre rows after 9 inches had been removed from each end of the rows. At each station the yield experiment was planted close to the stand test, and on the same date. The average yield results of the 4 Manitoba stations, together with the stand (emergence) data, are given in Table 5.

As results in Table 5 show, no beneficial yield effects were observed when sound, high quality flax seed was treated with such standard seed disinfectants as New Improved Ceresan, Arasan, and Spergon. On the other hand, seed treatment of severely fractured flax seed with New Improved Ceresan, applied either at the rate of 1/2 oz., 1 oz., 1 1/2 oz., or 2 oz. per bu., resulted in very significant increases in yield (Table 5). New Improved Ceresan applied at the rate of 1 oz., 1 1/2 oz., and 2 oz. per bu. was more effective than the 1/2 oz. and 1/4 oz. rates, but there was no significant difference in yield between the 1 oz., 1 1/2 oz., and 2 oz. rates. Arasan was not so effective as New Improved Ceresan, but it was much more effective than Spergon. DuBay 1452-F, applied at the 1/2 oz. and 1 oz. rates, was almost as effective as New Improved Ceresan applied at these dosages. In Manitoba, in 1945, the heavier flax stands from non-fractured (sound) seed, and from treated, fractured seed, outyielded the lighter stands from non-treated fractured seed.

Yield data obtained in Manitoba in 1944 (PDR Suppl. 159, pp. 215-219) showed that seed treatment of fractured flax seed did not increase yield, although it resulted in a very significant improvement in stand. In 1945, however, treatment of such seed markedly increased yield. The conflicting yield results of the 1944 and 1945 tests indicate that further field experiments are needed to elucidate the many environmental factors responsible for the variation in yield of fractured flax seed in relation to seed treatment.

DIVISION LABORATORY OF PLANT PATHOLOGY, WINNIPEG, MANITOBA, CANADA

DISEASES OF VEGETABLE CROPS DURING FEBRUARY IN PALM BEACH AND BROWARD COUNTIES, FLORIDA

G. R. Townsend, R. C. Cassell, E. L. Felix and
Russell Desrosiers

BEANS Powdery mildew (Erysiphe polygoni), made its appearance in a few fields of snap beans along the coast during February. In some fields the lower leaves of approximately 100 percent of the plants are affected.

Mosaic (Virus), was present in slight amounts in most fields along the coast. It was seen on about 60 percent of the plants in one field in Broward County the first week of February.

Watery soft-rot (Sclerotinia sclerotiorum) was much less serious in eastern Broward County than during the latter part of December and in January. At that time the disease could be found in practically every field in an area of 30,000 acres of beans. Losses were heavy as some fields were never picked and many yielded only one picking. Watery soft-rot reached only the southern limits of Palm Beach County and losses were too small to be considered significant.

Rust (Uromyces phaseoli var. typica), was found in three fields. A trace to 1 percent was seen in two fields in Broward County, and a trace on one field in the Everglades.

Anthracnose (Colletotrichum lindemuthianum), was found as a trace on maturing pods of one field in southern Palm Beach County the third week of February.

The spring planting of beans in the Everglades was well advanced by the end of the month. Conditions had been ideal and the young beans were in excellent condition.

CABBAGE Black rot (Phytomonas [Xanthomonas] campestris) was much less prevalent than it had been in December and January. It was seen in several fields to a small extent, but generally was not causing losses.

CELERY Early blight (Cercospora apii), although present in all fields, was generally under control and causing no loss.

Mosaics (Virus) were most prevalent near the borders of fields in proximity to weeds. Infection ranged up to 100 percent over small areas, but only a small amount of the plants showed browning of the petioles. Counts in one field where the grower was concerned about the loss showed that he was losing about 7 percent of the plants. In most fields the loss was much less than this.

CUCUMBER Downy mildew (Pseudoperonospora cubensis) was very severe on the plantings that are still in existence in the coastal area. In spite of dusts and sprays control has been inadequate and defoliation of the plants was rapid. Some young plantings were plowed under before picking started.

ESCAROLE A leaf spot (Alternaria sp.) occurred on a specimen of diseased excarole brought into the laboratory. The grower said it was quite destructive on two of his plantings.

LETTUCE Downy mildew (Bremia lactucae) occurred on the outer leaves of lettuce being harvested during the last week of February.

PEAS Powdery mildew (Erysiphe polygoni), has been noted on the two or three plantings seen on the coast. It is especially severe on the older plantings.

Ascochyta blight (Ascochyta sp.), was found as a small local outbreak in one planting in eastern Palm Beach County. Leaf spotting occurred over a diameter of about 20 feet but not over a dozen pods were lost.

Root rots (Rhizoctonia and Fusarium) were prevalent and occasionally destructive in a number of fields in the Everglades.

PEPPER Early blight (Alternaria solani) was present in several fields of eastern Broward County. Fruit rot has accounted for a loss of 1 to 2 percent of the fruits.

Bacterial spot (Xanthomonas vesicatoria) was present in a great many fields in the coastal area. Fruit spotting has not been common and the disease has been largely confined to a leaf spot.

Frog-eye (Cercospora capsici) was generally present in most coastal fields but usually less serious than mosaic and bacterial spot. It was only in the occasional field where control measures had been neglected that the disease developed seriously and fruit spotting and drop was heavy.

Pink-joint (Sclerotinia sclerotiorum) has been found in three fields in Broward County. The most serious infection noted accounted for a loss of about 3 or 4 percent of the plants.

Mosaic (Virus) was the most serious disease of peppers in coastal Broward County, and occurred to a lesser extent in eastern Palm Beach County. In Broward County some fields have been abandoned because of mosaic and others have yielded very little in the two or three pickings that were made. Fields with 100 percent infection were not uncommon and practically all fields had at least a trace with average field infection running 40 to 60 percent. Infection ranged from 50 to 95 percent averaging about 70 percent in several Everglades fields.

POTATO Late blight (Phytophthora infestans). One field in Broward County had been killed by blight.

The spring crop in the Everglades was planted during February. No reports of seed piece decay were received, although some was noted in experimental plantings.

SQUASH Powdery mildew (Erysiphe cichoracearum), appeared in a few older plantings in eastern Palm County. Infection was heavy on the older leaves and stems in a few fields.

Mosaic (Virus) increased to 92 percent in one field observed in the Everglades.

TOMATO Late blight (Phytophthora infestans) was generally present in most fields on the coastal areas of Broward and Palm Beach Counties. The disease was present in alarming proportions in 35,000 acres of tomatoes in Broward County the latter part of January and became generally present in 1,000 acres in eastern Palm Beach County by February 6. Except for occasional local showers, the weather during February was not conducive to the spread of late blight. Consequently the disease made little or no progress after the initial infections occurred, and in many fields new uninfected growth of the plants has replaced the older infected foliage. In Broward County picking was at its height in fields where the fruits were 10 percent affected by blight a month ago. Tomatoes from unsprayed fields in Broward County were being received at the packing plants in equally good condition with fruits from protected fields. Late blight continued to be prevalent on leaves and fruit of a few small plantings in the Everglades.

Stem rot (Sclerotinia sclerotiorum) was found as a trace in two fields in Broward County.

Early blight (Alternaria solani) was present in most fields but was largely confined to the older foliage and was causing very little perceptible damage.

Fusarium blight (F. oxysporum f. lycopersici), was present in several fields of eastern Palm Beach and Broward Counties. Counts of 3 to 5 percent have been made in some fields.

Mosaic (Virus) was noted running as high as 10 percent in some fields in eastern Broward and Palm Beach Counties, but less in the Everglades.

Bacterial spot (Xanthomonas vesicatoria), was seen in slight amounts in scattered fields of the coastal area.

An unidentified blight was prevalent on the leaves of the wild cherry tomato, Lycopersicon cerasiforme.

SUNFLOWER Rust (Puccinia helianthi-mollis), was noted on 100 percent

of the plants used as windbreaks in two fields in eastern Palm Beach County.

WEEDS Watery soft-rot (Sclerotinia sclerotiorum) was found generally affecting the common ragweed and milk weed in old bean fields in Broward County, where the disease had been present on the beans at an earlier date.

Mosaics (Virus) occurred on Portulaca and Commelina near celery fields.

EVERGLADES EXPERIMENT STATION, March 1, 1946

TOBACCO BLUE MOLD IN GEORGIA

J. G. Gaines

Blue mold [Peronospora tabacina] is now at the peak here at Tifton and also out in the major part of the tobacco belt. It reached its peak a week ago in the early areas, including part of the Florida flue-cured area, and will reach the peak in the latest Georgia areas next week. Damage has been considerable, probably as high as 30 percent of the plants killed to date, with a definite plant shortage reported in a few counties. I visited Wayne County yesterday, over near the coast, where the peak was reached last week. The best beds I saw did not look half as well as our worst checks. Many beds show less than 6 plants per square foot remaining, not nearly enough to set the planned acreage. Since many others show considerably more plants than this, it is still too early to state that the plant shortage will be general. Unfortunately many beds were partly drowned early in the season and stands were not too good to begin with. Also fewer growers than usual started out to control mold this year, because they recalled that the disease was not destructive last year. Consequently when they decided that they had better get busy, it was too late.

DIVISION OF TOBACCO, MEDICINAL, AND SPECIAL CROPS, U. S. BUREAU OF PLANT INDUSTRY, SOILS, AND AGRICULTURAL ENGINEERING, TIFTON, GEORGIA. March 16.

SOME UNUSUAL DISEASE OCCURRENCES

PHYTOPHTHORA ISOLATED FROM RUSSIAN OLIVE

By J. C. Carter

A wilting Russian olive (Elaeagnus angustifolia L.), on the University of Illinois campus, brought to our attention in October, 1945,

was affected with a canker which extended from the soil line up the trunk about two feet. The canker had developed and had girdled the trunk during the summer of 1945. The bark, cambium and 1945 wood of the diseased region were dark brown to black. Also, light brown streaks extended up the trunk beyond the cankered area in the 1945 springwood. Discoloration was not present in 1944 and older wood.

A Phytophthora was isolated from the diseased inner bark and current-season wood. Cultures of this fungus were sent to Dr. C. M. Tucker, University of Missouri. He considers this fungus to be Phytophthora cactorum (Leb. & Cohn) Schroet.--Section of Applied Botany and Plant Pathology, Illinois Natural History Survey, Urbana, Illinois.

PHYLLOSTICTA HEDERAE ON ENGLISH IVY

By David Gottlieb

The presence of Phyllosticta hederae on the English Ivy (Hedera helix) is not generally recognized. The fungus is not listed in Seymour's Host index nor is any reference to it contained in the check list of the U. S. Department of Agriculture or in that of the Arnold Arboretum. Dodge and Rickett indicate P. concentrica as the common cause of the Phyllosticta leaf spot of English Ivy in the United States.

During the spring of 1945 an outbreak of a leaf spot on the English Ivy was observed on the campus of the University of Delaware. About 75 percent of the old leaves were infected. The disease first appeared as a small brown spot which gradually enlarged. The upper surface of the leaf spot sometimes turned grey and pycnidia were observed in the fall. Premature shriveling and dying of the leaves took place. The pycnidia were black and generally scattered over the infected area. An examination of the fruiting bodies showed the presence of very small spermatia-like spores, and the causal organism was identified as P. hederae. The spores averaged 1.37 x 4.5 μ which is slightly larger than has been described for this species.

Correspondence with B. O. Dodge revealed that a similar leaf disease on the English Ivy occurred at the Bronx Botanical Gardens at about the same time and had been identified by him as due to P. hederae. Samples of the Delaware disease were examined by Dodge and the fungus found to be similar to that occurring in the Botanical Gardens. Specimens of the leaf spots from both areas have been placed in the herbarium of the New York Botanical Gardens.--Division of Plant Pathology, Department of Horticulture, University of Illinois, Urbana.

A LEAF BLIGHT OF JACK-BEAN IN CUBA

By John A. Stevenson

The Jack-bean (Canavalia ensiformis) is rather commonly grown as a forage and cover crop, and even as an ornamental, in the far South of this country and in various Islands of the West Indies. As a rule it is relatively free of disfiguring or destructive diseases. There have come to our attention recently, however, specimens of an interesting and apparently heretofore unreported leaf disease of this host occurring in Cuba. The material in question was collected some years ago by the late Dr. J. A. Faris in experimental plantings made by the Tropical Research Foundation at Central Barágua in Camaguey Province, Cuba.

The disease is characterized by a spotting and subsequent blighting of the leaflets sufficient to cause considerable loss of leaf area and even partial defoliation. Diseased areas are at first roughly circular, up to a centimeter in diameter, dull brown in color with a darker very definite bordering line, but soon become irregular and confluent to cover large portions of affected leaflets. Diseased areas fade out finally through dull tan to ashen, appearing much the same on both leaflet surfaces.

With a hand lens there are noted on lower surfaces coarse, light brown hyphal threads radiating over the diseased spots and extending some distance out on to otherwise apparently normal host tissue. In places on the spots these hyphae form cobwebby, somewhat powdery mycelial mats which microscopically are found to be the fruiting stage of the fungus.

Similar diseases have been recently reported on Hevea brasiliensis by Kotila (Phytopath. 35: 739-741, 1945) and on cotton by Neal (Phytopath. 34: 599-602, 1944). The causative fungus has been reported as Pellicularia filamentosa (Pat.) Rogers for both hosts and in the absence of any observable morphological differences the Canavalia fungus also is considered the same. Rogers very properly has made his Pellicularia filamentosa broadly inclusive in the absence of definite morphological differences in the forms occurring on the several hosts, but it is probable that with further comparative studies it will be found expedient to segregate some of the more striking forms and establish new binomials for them.--Division of Mycology and Disease Survey.

FEBRUARY WEATHER

(From U. S. Department of Commerce, Weather Bureau, Weekly Weather and Crop Bulletin for week ending, March 5, 1946.)

Map I shows that February 1946 was considerably warmer than usual over the greater portion of the country, the exceptions being in the far North-

east, northern Minnesota, and the far Southwest, where departures ranged from near to a few degrees below normal. The plus anomalies ranged from a few degrees on the south Atlantic, Gulf, and north Pacific coasts to more than 10° in north-central Montana and the central portion of the western Plains.

Map II presents the areal distribution of total precipitation for February 1946. The month was wetter than usual from eastern Texas northeastward to the Ohio Valley and Virginia, in the far Northeast, Minnesota, and extreme western Washington. Elsewhere, precipitation was generally near to considerably below normal. Amounts were 50 percent more than normal in sections from northeastern Texas to the lower Ohio Valley and in Minnesota and a few adjacent areas. Less than half of the usual precipitation was received in a large area extending from the southern Lake region westward over practically the entire region from the western Plains to California, with many sections receiving less than 10 percent of their normal, notably northwestern Kansas, southwestern Nebraska, and southwestern New Mexico.

WINTER OF 1945-46

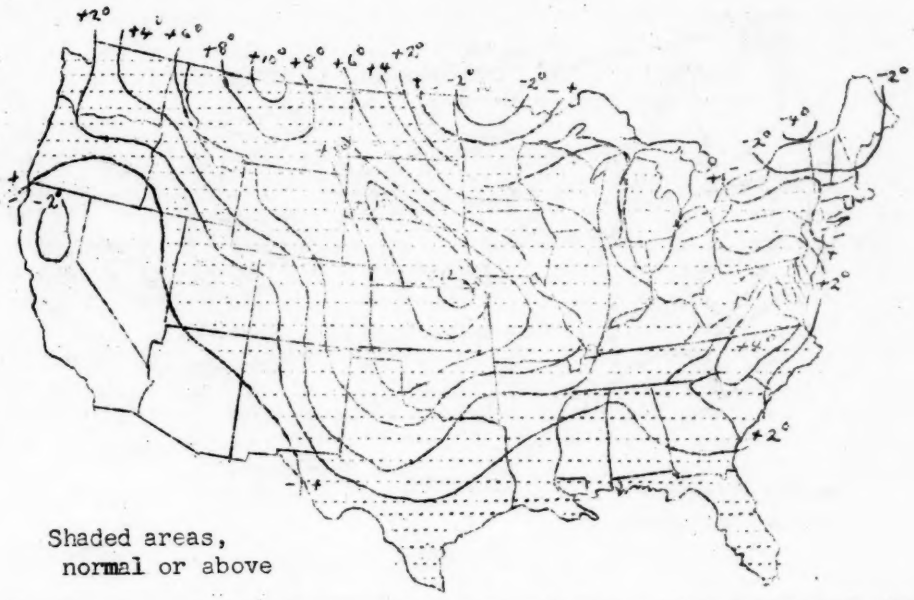
(From U. S. Department of Commerce, Weather Bureau, Weekly Weather and Crop Bulletin for week ending, March 5, 1946.)

Map III shows that the meteorological winter of December 1945 through February 1946 averaged cool in the Northeast, from the lower Mississippi Valley to the south Atlantic coast, in Minnesota, and a few east-central areas. Elsewhere it averaged from about normal to considerably above.

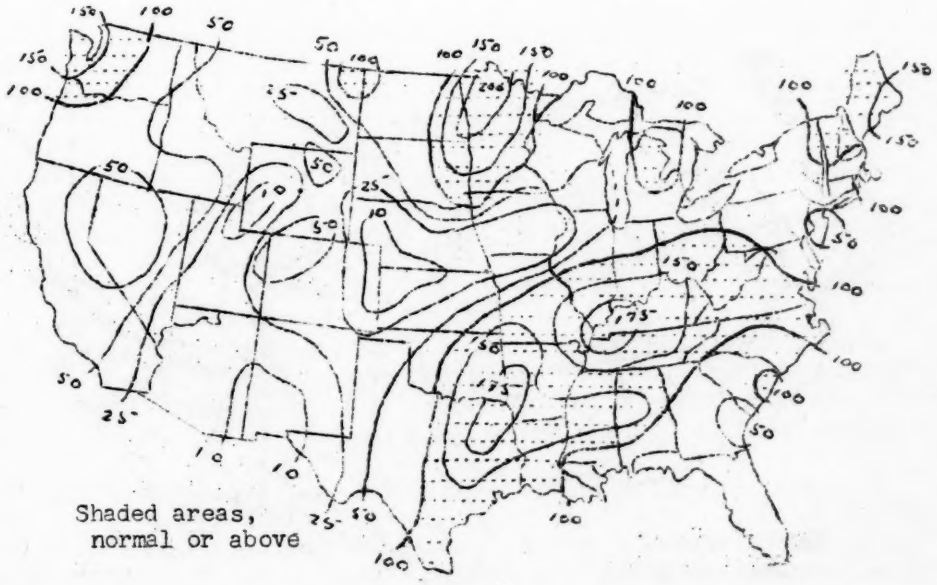
Temperatures averaged 2° below normal in northern New England, northern New York, northern Minnesota, and in sections of the lower Mississippi Valley. The plus anomalies ranged from 2° in the central Mississippi Valley, northern Texas, and western Washington to over 6° in north-central Montana and northeastern Wyoming.

Map IV shows that the total precipitation for the winter was considerably above normal from Minnesota and the eastern Dakotas southward over the South Atlantic and Gulf States, except Florida. Elsewhere the amounts were near to much above normal.

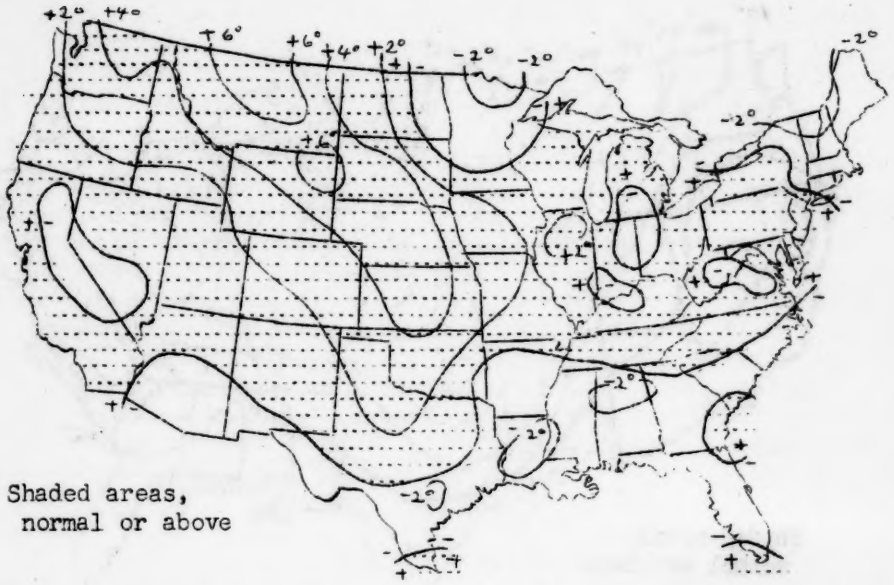
The greater portion of the region from the western Great Plains to the Great Basin of the far West received less than half of the usual precipitation for the winter. This was especially true in the area from western Kansas to southwestern North Dakota and in sections of the Great Basin.



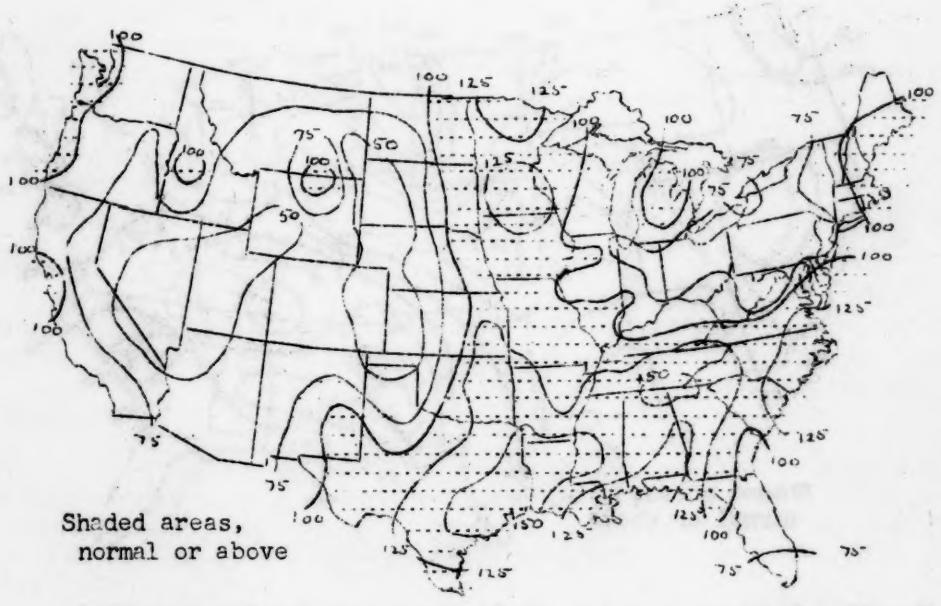
Map I. Departure of Mean Temperature from the Normal for February 1946.



Map II. Percentage of Normal Precipitation for February 1946.



Map III. Departure of Mean Temperature from the Normal for Winter 1945-46.



Map IV. Percentage of Normal Precipitation for Winter 1945-46.